Targeted Intervention Influences Self-Reported Health Behaviors During Pregnancy

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Abstract

Objective: The purpose of this study was to describe self-reported health-promoting lifestyles in women at three time points in pregnancy and to test for differences between control and intervention groups enrolled in a walking intervention. **Background:** During pregnancy a woman is perceived to be most active in her health care and more open to health behavior change. Improved nutrition, activity, rest, and reduced alcohol and smoking consumption are reported. Research to identify specific health behaviors in the context of a health-promoting intervention is limited. **Subjects:** One hundred twenty-three pregnant women with a history of preeclampsia enrolled in an intervention to reduce recurrent preeclampsia. Women were randomized to an intervention group (n=62) or an attention control group (n=61). The analysis was conducted on a subset of 79 subjects (intervention = 36 and control = 43) for which data were complete. **Methods:** Data were drawn from the longitudinal study, ***Exercise Intervention to Reduce Recurrent Preeclampsia*** (R01 NR05275).All participants (n=79) completed the Health-Promoting Lifestyle Profile II (HPLPII), a 52-item questionnaire, at Baseline (T1)(18 weeks gestation), time 2 (T2)(28 weeks), and time 3 (T3)(34 weeks). Total HPLPII subscale scores were described across the time points, and group differences were tested by repeated measures ANOVA. **Results:** Women who participated in the study were 29.5 years of age, while 87.5% of women were Caucasian, and 12.5% of women were African-American. For all participants, the HPLPII total score (mean±SD) was significantly increased over time, specifically T1 2.78±.41, T2 2.91±.43 and T3 2.93±.46 ($F = 20.92$, $p = .000$). The mean subscale scores, when significantly different, were higher at T3 as compared to T1 and T2 except physical activity, which was highest at T2. While observing for group differences, total HPLPII score ($F = 7.06$, $p = .010$), health responsibility ($F = 5.79$, $p = .019$), physical activity ($F = 25.55$, $p = .000$), and stress management ($F = 11.13$, $p = .001$) were higher for women receiving the walking

intervention than those in the control group. The remaining scores for the subscales of nutrition, spiritual growth, and interpersonal relations showed no significant differences between the two groups. **Conclusions:** Both a behavior-specific and attention-control intervention positively influenced self-report of health-promoting lifestyles during pregnancy. The overall health promotion score and all significant subscale scores with the exception of physical activity were highest during the third trimester. Such a finding suggests women may be more willing to practice health promotion behaviors during the third and final trimester when their pregnancy becomes most real. For those receiving the intervention targeted at increasing physical activity, the subscale score for physical activity was increased over time, but more so from the first to the second trimester. Women enrolled in a walking program were part of a targeted-behavioral intervention which focused on physical activity. These women reported significantly higher total HPLPII scores, and they reported significantly more positive health behaviors in the areas of health responsibility, physical activity, and stress management, commonly indicated as positive effects of increased activity. Such findings suggest improving one behavior through a targeted intervention, such as a walking program, can improve overall health promotion, even in areas of health promotion outside the realm of the targeted-intervention.

Keywords: health promotion, high-risk pregnancy, preeclampsia, exercise intervention, Health-Promoting Lifestyle Profile II

Introduction

American healthcare is moving towards a focus of disease prevention rather than disease management. In the past, emphasis was placed on the disease process and tertiary care. Now, providers understand the importance of preventative medicine and patient education, and how such intervention enables patients to prevent disease before it manifests (Viau et al., 2002). Insurance companies are even beginning to reimburse for preventive tests, screens, and educational sessions, as research supports the idea that disease prevention and health promotion save health care dollars, resources, and time. Although healthy behaviors, such as nutrition, physical activity, stress management and social support, are important across the lifespan, there is a perception that pregnancy presents a special opportunity for women to adopt a healthier lifestyle.

The American Journal of Health Promotion defines health promotion as "the science and art of helping people change their lifestyle to move toward a state of optimal health, which is a balance of physical, emotional, social, spiritual, and intellectual health" (O'Donnell, 1989). According to the World Health Organization, health promotion enables people to increase control over the determinants of health and therefore practice good health behaviors to improve their well-being. Pender's Health Promotion Model (HPM) classifies the determinants of health behavior in to three categories: (1) individual character and experience (2) behavior specific cognition and affects (3) situational or interpersonal influences (Pender, 1996). In order for health promotion success, it is said that people must believe they have the power to shape their own destiny through their actions and behavior. They must therefore possess a perceived self-efficacy (Pender, 1996). See Figure 1 for a diagram of Pender's Health Promotion Model.

For the purpose of this study, Pender's Health Promotion Model was used as a theoretical framework. For example, pregnant women, specifically high-risk pregnant women, seem to possess all three determinants of health behavior change. First, pregnancy, as a "social and environmental factor," can be considered a situational or interpersonal influence of health behavior (Pender, 1996). Society has this norm or perception for how pregnant women should act and care for themselves in order to protect their unborn baby. Pregnancy is also a time in a woman's life when she is perceived to be most active in her healthcare, and is therefore, more likely to adopt good health behaviors. While pregnant, a woman possesses an additional motivation for change, that of producing a normal, healthy baby (LeWallen 1989). Research by Higgins et al. (1994) suggests that some women independently practice health behavior change during pregnancy, especially in the areas of improved nutrition, activity, rest, and reduced alcohol and smoking consumption.

According to Pender and her Health Promotion Model, additional catalysts for health behavior change exist, including a recognition that behavior will have an effect on health and influencing factors. In this particular study, participants are pregnant women with a history of preeclampsia, a high risk implication of pregnancy with high blood pressure, edema, and proteinuria as the hallmarks. The diagnosis of preeclampsia can be considered an individual experience that may influence a woman's future willingness to change, particularly since the recurrence rate is 20% (1 in 5 women), and for those women with recurrence, there is a greater likelihood of early onset cardiovascular disease (Carty et al., 2010). Understanding such risks associated with preeclampsia is a behavior specific cognition for participants. If women understand good health behaviors, the benefits and barriers to their actions, and subsequent consequences, they have a behavior-specific cognition and affect. Therefore, these women, who

are currently pregnant, have had a previous high risk pregnancy, and understand their risks, are assumed to possess three different determinants for change, as defined by Pender.

Despite this possession of three positive determinants for health behavior change, little research has been done on health promotion and health promotion interventions for pregnant women. Good health promotion in pregnant women is essential as healthcare during pregnancy not only affects the pregnant mother, but it is an important indicator of health for mother and child (USDHHS, 2000).

Healthy People 2010 is a published agenda to encourage health promotion and decrease health disparities by establishing goals for American health. One important goal of Healthy People 2010 is to "improve the health and well-being of women, infants, children, and families" (USDHHS, 2000). In order to increase the likelihood of giving birth to a healthy infant, the mother must maintain or improve her own health. The key to producing a healthy baby is having a healthy mother, as that baby depends on maternal blood supply, nutrients, and oxygen for nine months, during which the fetus is in its most important stage of development.

Unfortunately, mothers do not keep themselves as healthy as they could, and their lack of healthy behaviors leads to complications and death for both themselves and their babies. In fact, 1,500 women die every day worldwide due to complications in pregnancy or childbirth, while 10,000 babies per day are born dead, and another 10,000 babies die within their first month of life (World Health Organization, n.d.). In 1997, 327 maternal deaths were reported in the United States, with the major causes of death being hemorrhage, ectopic pregnancy, pregnancy-induced hypertension (or preeclampsia), embolism, and infection (USDHHS, 2000). This mortality rate is on the rise again. In fact, maternal mortality rate has not declined since 1982, nor has the

disparity between African American and white women. African American women are still 3.6 times more likely to die during the antepartum, intrapartum, and postpartum stages of pregnancy than their Caucasian counterparts (USDHHS, 2000).

One major complication of pregnancy is preeclampsia. Preeclampsia occurs in 3-8% of all pregnancies in the United States and is a leading cause of maternal morbidity and mortality worldwide (Carty et al., 2010). For the mother, preeclampsia can result in complications such as renal failure, HELLP syndrome (hemolysis, elevated liver enzymes, and thrombocytopenia), seizures, liver failure, stroke or death. Meanwhile, the fetus may experience such complications as small-for-gestational-age weight status, preterm delivery, hypoxic neurologic injury, or death (Baumwell & Karumanchi, 2007). Annually, in the United States, there are over 204,000 hospital admissions due to hypertension during pregnancy, costing the country over 2.2 billion dollars a year (Agency for Healthcare Research and Quality, 2003). Preeclampsia is often considered a complication of the first pregnancy; however, 1 in 5 women will suffer recurrent preeclampsia, and those 20% are at an increased risk for early onset cardiovascular disease (Carty et al., 2010). Recurrent preeclampsia and cardiovascular disease add additional costs to the nation, mother, baby, and family that are financial, physical, and psychological in nature.

Infant mortality rate is an important measure of how well we care for our women and children and is representative of the overall health of society. According to data from the Ohio Department of Health and March of Dimes, the United States has an infant mortality rate of 6.4, which is higher than 28 other developed nations, though we as a country spend significantly more money on prenatal and neonatal care, suggesting American dollars may be misdirected (as cited in Infant Mortality Task Force, 2009). For example, a report from the international Organization for Economic Cooperation and Development (OECD) shows that “total health

spending accounted for 16.0% of GDP in the United States in 2007, by far the highest share in the OECD…The United States also ranks far ahead of other OECD countries in health spending per capita, with spending of 7,290 USD in 2007, almost two-and-a-half times greater than the OECD average of 2,984 USD" (Organization for Economic Cooperation and Development, n.d.).

According to data from the Ohio Department of Health, March of Dimes, and Ohio Department of Job and Family Services, Ohio's infant mortality rate is even higher than the national average at 7.8 (2006) and has not changed substantially in over a decade. Both rates for nation and state exceed the national goal of 4.5 established by the federal Department of Health and Human Services in the Healthy People 2010 initiative (as cited in Infant Mortality Task Force, 2009). Since the release of Healthy People 2000, "no progress or movement in the wrong direction has occurred in the areas of maternal death, fetal alcohol syndrome, and low birth weight." Therefore, goals for 2000 have been reestablished by Healthy People 2010, and more research in the area of maternal health promotion is necessary for progression in the right direction.

It is difficult to determine the cost of infant mortality and morbidity to the nation because of the long-term consequences to the individual, family, and society. Often, infant mortality is best addressed in the context of prematurity, as preterm birth remains a leading cause of infant death today. In the United States, an average of 1,200 (1 in 8) babies are born prematurely everyday (March of Dimes, 2010). Data from the Ohio Department of Health, March of Dimes, and Ohio Department of Job and Family Services states average hospital costs alone for a premature baby are $49,033, compared to $4,551 for a full-term, healthy baby (as cited in Infant Mortality Task Force, 2009). In addition to the original hospital stay, many survivors of preterm birth suffer lasting disabilities such as cerebral palsy, mental retardation, learning problems,

chronic lung disease, and vision and hearing problems (March of Dimes, 2010). Therefore, it is extremely important for healthcare providers to improve prenatal care and health promotion in pregnant women. If women are healthy throughout their pregnancies, they are less likely to experience costly and often detrimental maternal and fetal complications, like preeclampsia, prematurity, and the long-term effects of both.

This study aims to broaden our knowledge-base regarding the health promotion behaviors and tendencies of pregnant women, specifically women who have experienced a high risk pregnancy in the past due to preeclampsia. Three study aims have been identified. Aim one hopes to describe self-reported health-promoting lifestyles in women at three time points in pregnancy. Aim two is to test for differences in self-reported health promoting lifestyles between the three time points in pregnancy. Lastly, aim three will identify differences in self-reported health-promoting lifestyles between those women enrolled in a walking intervention as compared to those in an attention-control group.

Review of the Literature

Health behaviors during pregnancy are known to impact the health of both mother and baby. Therefore, pregnant women are more likely to improve health behaviors and be open to health behavior change at this time. Exploratory research by Higgins, Brown, and Frank (1994) surveyed pregnant women to describe the health behavior changes they have made since becoming pregnant. One hundred and fifteen women were interviewed during the study. Eighteen changes in health behavior were reported by the women, with 49% of the women reporting changes in diet, exercise patterns, vitamin intake, alcohol consumption, and smoking habits (Higgins et al., 1994). The area with the biggest change was physical activity. 82 women (71%) made changes in their exercise regime. For example, many expressed that they were walking more, and those who were already aerobically-fit reduced heavy workouts (Higgins et al., 1994). Viau, Padula, and Eddy performed a different study on pregnant women over age thirty-five to analyze their health promotion behaviors. Advanced maternal age (>35) is commonly seen as a risk factor for potential maternal and fetal compromise, similar to the diagnosis of preeclampsia. Still, a large majority, 86% of these women, reported interest in pursuing multiple health-promoting behaviors with a focus on nutrition, activity, and rest patterns (Viau et al, 2002). Findings from Viau and Higgins support the importance of health education during prenatal visits because high awareness towards good health exists. Nurses can be instrumental in implementing such education for health behavior change.

Unfortunately, no research has been performed on the specific timing and types of health promotion interventions to implement. We know pregnancy is appropriate for teaching health behaviors that are good for both mom and fetus, but nothing is known about when women prioritize different behaviors, and whether interest in certain behaviors differs between the

trimesters. De Muth (1989) and Gessner (1989) emphasized the importance of assessing client interest if education is going to be effective. Gessner says practitioners should begin client-teaching with whatever interests the client, even if that topic is not a priority for self-care. Reliance on interest of the client can motivate the client toward further learning (Gessner, 1989).

Freda et al. (1992), compared what health topics pregnant women were interested in to what providers perceive as their client's interests. Findings revealed that provider and client interests were significantly different for 25% of the topics. It is known that provider interest greatly influences what information is shared. Therefore, it would be beneficial if providers were more aware of what health topics interest clients and at what time client interests are highest (Freda et al., 1992).

Much of the available research focuses on maternal health and its impact on the health of the infant. However, Healthy People 2010 extends the idea, saying "the effect of pregnancy and childbirth on women is an important indicator of women's health" (USDHHS, 2000). Improving maternal health through proper intervention at the time of pregnancy could improve a woman's overall health. Of course, this assumes the woman will apply good-health behaviors learned during pregnancy to her life after childbirth, which has not yet been fully researched.

Additionally, Healthy People 2010 created a goal to "improve the health and well-being of women, infants, children, and families" (USDHHS, 2000). This goal is in response to 1997 statistics that include 327 maternal deaths. This death toll has decreased over the years, but is now on the rise again (USDHHS, 2000). After release of Healthy People 2000, "no progress or movement in the wrong direction has occurred in the areas of maternal death, fetal alcohol syndrome, and low birth weight" (USDHHS, 2000). In fact, 327 maternal deaths were reported

in 1997, and this number practically doubled by 2005, with 623 maternal deaths in the United States (American Congress of Obstetricians and Gynecologists, 2010). Due to this regression in maternal well-being, Healthy People 2010 strives to "reduce maternal illness and complications due to pregnancy and increase the proportion of pregnant women who receive early and adequate prenatal care" (USDHHS, 2000).

The adequacy of prenatal care is measured by two dimensions: the adequacy of initiation of care and the adequacy of the use of prenatal services once care has begun. According to these dimensions and statistics from the American College of Obstetricians and Gynecologists, nearly 75% of women receive adequate prenatal care (as cited in Healy et al., 2006). The number of mothers who entered prenatal care in the first trimester increased by 8.8% in whites, 19% in African Americans, and 22% in Hispanics over the years without influencing the maternal death disparities between race (as cited in Healy et al., 2006). This information suggests that prenatal care needs improvement, and providers can start by improving the timing of educational interventions.

Good health promotion education and interventions for pregnant women are essential to improving prenatal care and maternal and fetal outcomes during pregnancy, the birthing process, and life. What a pregnant woman does to her body, whether it be the intake of drugs, medication, exercise, or nutrition, has a direct effect on the health of the baby. Extensive research has been performed on the relationship between specific health behaviors and pregnancy outcomes (Higgins et al., 1994). For example, a review of evidence supports maternal intake of folic acid as effective in reducing neural tube defects (NTDs) and mortality from NTDs (Blencowe et al., 2010). Therefore, the health behavior of folic acid supplementation is directly related to a reduction in negative birth outcomes.

In addition, obese women are known to have a significantly higher maternal and perinatal morbidity rate than women of normal weight (Pathi et al., 2006). Likewise, higher maternal nutrient intakes of fiber, phosphorous, iron, vitamin B(6) and folic acid result in significantly higher birth weights ($p<0.05$), where higher birth weights are associated with improved infant outcomes (Bang & Lee, 2009). Though it seems common knowledge now, several researchers, including Aaronson and MacNee (1989) have discovered a significant relationship between smoking and perinatal mortality.

As our population as a whole struggles with poor nutrition, obesity, sedentary behavior, and smoking, these negative health behaviors are also increased in our target population, women who are pregnant or have the capacity to become pregnant. Despite spending the most money on healthcare, the United States has an unreasonably high number of premature and low-birth-weight babies because of such negative health behaviors. Making moms healthier in a natural, lifestyle-modifying way could decrease the number of unhealthy babies and likewise, the number of adults who develop chronic disease due to their unhealthy lifestyles and bad health habits.

This particular research project will fill gaps in the area of overall health promotion and the effectiveness of a targeted behavioral intervention on health promotion as a whole. New information will provide insight in to which healthcare behaviors women prioritize and at what time behavior-specific prioritization occurs. Maternal interest in certain behaviors can be used to time educational interventions so that interventions have the largest emotional and educational impact on mothers.

Methodology

This study was a secondary analysis of data drawn from ***Exercise Intervention to Reduce Recurrent Preeclampsia*** (R01 NR05275) by Dr. Thelma Patrick of The Ohio State University, College of Nursing.

Sample

The original study was a longitudinal study that included 123 pregnant women. Eligibility criteria for these 123 women required that the women be pregnant, be enrolled in the study before 20 weeks gestation, and have had preeclampsia in their immediately previous pregnancy and no other prior pregnancies. In addition, women were excluded if they had been engaged in previous regular physical activity (as characterized by 20 minutes a day/three days a week) for the past six months or if they had any other chronic medical condition placing them at increased risk for preeclampsia (ie: esstential hypertension, diabetes, or multiple gestation).

Recruitment of women in this specific population (only 5-8% of pregnant women develop preeclampsia) was difficult. Therefore, recruiters used a variety of recruitment strategies to target the narrowly defined population of women. Recruiters advertised the study in pediatrician offices, child care centers, Parent Teacher Organization (PTO) meetings, and in various churches and synagogues in the Pittsburgh, Pennsylvania area. The study was also advertised in the Pennysaver and other local publications, including the Pittsburgh Parent, published Sept 17, 2002. In addition, brochures about the study were distributed to childbirth educators and at different public events.

Procedure

Once recruited, the pregnant women were enrolled in a randomized control trial where they were randomly divided in to a walking intervention group or an attention-control group. The method of randomization was a permuted block design. The walking intervention group was asked to walk for 10 minutes, 3 times a day, for at least 5 days a week and received counseling and education to encourage exercise and discuss health. There were 14 counseling and education sessions (1 every 2 weeks, 12 during the pregnancy and 2 following delivery), lasting 10-15 minutes each. Sessions were held both in person and over the telephone. Women in the walking intervention were asked to wear a digiwalker (step counter) to ensure that they met walking requirements.

Meanwhile, women in the attention-control group received 10-15 minute interviews every two weeks for a total of 14 sessions. Similar to the women in the intervention group, interviews alternated between face-to-face and over the telephone. During interview sessions, women were asked about their health, pregnancy discomforts, and actions taken to stay healthy; however, there was no enrollment in a walking program. Women in both groups were asked to complete a daily exercise diary, a seven-day physical activity recall, and a perceived self-efficacy questionnaire.

Instruments

Pregnant women from both groups were surveyed about their health-promoting behaviors at three different time points. Surveys were distributed during face-to-face sessions at entry in the study (T1), at approximately 28 weeks (T2), and again at approximately 34 weeks (T3).

Susan Noble Walker's (1995) Health-Promoting Lifestyle Profile II was the questionnaire used to determine the participants' level of health promotion. The Health-Promoting Lifestyle Profile II is a 52-item questionnaire derived from the Pender Health Promotion Model. It includes six subscales of health promotion, which assess for health behaviors in the areas of health responsibility, physical activity, nutrition, interpersonal relations, spiritual growth, and stress management.

An article by Noble and Hill-Polerecky (1996) describes "the revision of the Health-Promoting Lifestyle Profile and the psychometric evaluation of the Health-Promoting Lifestyle Profile II (HPLPII)". The scale was deemed effective in assessing health promotion behaviors through the following analysis:

> Data from 712 adults aged 18 to 92 were used to assess validity and reliability of the scale. Content validity was established by literature review and content experts' evaluation. Construct validity was supported by factor analysis that confirmed a six-dimensional structure of health-promoting lifestyle, by convergence with the Personal Lifestyle Questionnaire (r = .678), and by a non-significant correlation with social desirability. Criterion-related validity was indicated by significant correlations with concurrent measures of perceived health status and quality of life (r's = .269 to .491). The alpha coefficient of internal consistency for the total scale was .943; alpha coefficients for the subscales ranged from .793 to .872. The 3-week test-retest stability coefficient for the total scale was .892. (Noble & Hill-Polerecky, 1996).

Women responded to questions using N (never), S (sometimes), O (often), or R (routinely), according to how often they participated in the mentioned good-health behaviors.

Responses of N, S, O, and R were keyed in to the computer data system as 1, 2, 3, and 4 respectively.

Analysis of Data

Data analysis was performed using the SPSS software. Mean scores for the total Health-Promoting Lifestyle Profile II score and all individual subscale scores were calculated across the time points. Significance was tested using repeated measures ANOVA, and three independent variables were considered. Mean scores as they related to the control and intervention group assignments were also analyzed, and their significance calculated. The level of significance used was $p < .050$.

Results

Sample

Women who participated in the study were 29.5 years of age. As for race, 87.5% of the women were Caucasian, and 12.5% of women were African-American. Because more women are having their first babies later in life, the average age for first-time moms jumped from 21.4 in 1970 to 25.0 years of age in 2006. Although our sample age is higher than 25.0, it is not the first pregnancy for these mothers.

Following enrollment into the study, the 123 women were randomized in to an attention-control or exercise intervention group. Of the 123 participants, only a total of 79 women completed all three Health-Promoting Lifestyle Profile II assessments. Forty-three of these women were in the control group, while thirty-six were in the walking intervention. Baseline differences between the two groups were tested and found to be statistically insignificant in terms of age, baseline health, and health-promoting lifestyles. Mean age for women in the control group was 29.79±.4.6, while mean age for women in the walking intervention group was 29.54±5.34. A significant difference in race distribution within the subset was found between the groups, as there were significantly more black women in control group (n=9) as compared to the walking group (n=1)($p = .014$) using the Fisher Exact Test.

Health-Promoting Lifestyles

Aim one of the secondary analysis was to describe self-reported health promotion lifestyles in women at three different time points in pregnancy. Means were calculated for the Total Health-Promoting Lifestyle II score and six subscale scores across the three time points. These numbers included responses from women in both the control and intervention group, and

differences between groups were not yet considered. Means were recorded on a 95% confidence interval. Total HPLPII scores increased over time from 2.78±.41 at T1, 2.91±.43 at T2, and 2.93±.46 at T3 ($F = 20.92$, $p = .000$). Three of the six subscale scores followed this same trend, and their mean scores increased from time 1 to time 2, then again from time 2 to time 3. The subscales of health responsibility, nutrition, and stress management were the four subscales to increase scores over time. Meanwhile, the other three subscales scores, physical activity, spiritual growth, and interpersonal relations, trended differently. Physical activity had a highest mean score at time 2 or around the second trimester. The HPLPII subscale scores for physical activity were 2.03±.57 at T1, 2.47±.70 at T2, and 2.35±.76 at T3 ($F= 25.89$, $p=.000$). The subscale of interpersonal relations had a mean of 3.30±.57 at time 1, 3.24±.53 at time 2, and 3.30±.55 at time 3 ($F= .34$, $p= .560$). This scale decreased from time 1 to time 2 then increased again from time 2 to time 3. See Table 1 for a description of the total HPLPII score and subscale scores over time.

Aim two, to test for differences in self-reported health promotion lifestyles between the three time points, was completed next. The total Health-Promoting Lifestyle Profile II score was found to be statistically significant between the three time points ($F= 20.92$, $p= .000$). The subscale scores of health responsibility ($F= 19.11$, $p= .000$), physical activity ($F= 25.89$, $p=.000$), nutrition ($F= 17.09$, $p= .000$), and stress management ($F= 18.67$, $p= .000$) were also statistically significant between the three time points, suggesting that time is related to how active a woman is in her health promotion or how likely she is to participate in good health behaviors for the specific health-promoting categories of health responsibility, physical activity, nutrition, stress management, and total health promotion.

For these four subscale and total HPLPII scores, the assessment completed in the third trimester had the highest mean score on all scales except physical activity, which was highest in the second trimester. The mean subscale scores for spiritual growth and interpersonal relations demonstrated no significant difference between times 1, 2, and 3, suggesting time does not play as significant a role in determining how much emphasis women place on these particular behaviors.

Health-Promoting Intervention

Aim 3, perhaps the most important aim, was to test for differences in self-reported health-promoting lifestyles between those women enrolled in a walking intervention as compared to those in the control group. Refer to Table 2 for a breakdown of HPLPII scores at T1, T2, and T3 for both women in the control and intervention groups. The total Health-Promoting Lifestyle Profile II score was found to be significantly higher ($F = 7.06$, $p = .010$) for women in the walking program than those in the control group. Three of the six subscales were also found to have significantly different scores between groups. For these three subscales, health responsibility ($F = 5.79$, $p = .019$), physical activity ($F = 25.55$, $p = .000$), and stress management ($F = 11.13$, $p = .001$), women in the walking intervention scored significantly higher than women in control group. Subscale scores were not significantly different between the two groups for the subscales of nutrition, spiritual growth, and interpersonal relations.

Discussion

Though women have demonstrated an increased focus on their health during pregnancy, health teaching and support can increase the health focus in an area of need. For example, both a behavior-specific and attention-control intervention positively influenced self-report of health-promoting lifestyles during pregnancy. The total HPLPII score and all four subscale scores showing significant increase over time moved from the lowest score at T1 to the highest score at T3, with the exception of physical activity. Physical activity alone scored highest in the second trimester. Such a finding suggests specific health behavior changes important to a woman's well-being can be implemented during pregnancy; however, women may be more likely to participate to a greater degree in the third trimester when their pregnancy becomes most real, and positive health behavior change implemented early in pregnancy is practices and reinforced. This is not necessarily true for physical activity because of the physical limitations of pregnancy apparent in the third trimester. Such information can be used by healthcare practitioners to time health promotion interventions as patient education is most effective when teaching correlates with patient interest (Gessner, 1989).

Because patient interest appears to reach its highest in the third and final trimester, additional research needs to explore the timing and reinforcement of interventions to improve health before and during pregnancy. It would be beneficial to research barriers to health promotion in the first trimester. If researchers are aware of barriers, they can then test methods to overcome such barriers. For the sake of mom and baby, it is of utmost importance to target women and positively influence their health promotion patterns before trimesters two and three. The first trimester is key to the development of vital fetal organs and structures, and the health patterns of trimester one influence behaviors practiced in trimesters two and three.

For those women receiving the intervention targeted at increasing physical activity, the subscale score for physical activity was again highest in the second trimester, and women in the walking program reported significantly more participation in physical activity than women in the attention-control group. Such a finding suggests that even high-risk women can be encouraged to increase activity during pregnancy, and they will place greater emphasis on the importance of that activity when enrolled in a walking program. During the walking intervention, only one specific health behavior (that of physical activity) was targeted. Despite the walking programs lack of emphasis on the other areas of health, women in the walking program showed no evidence of decreased participation in other health promotion areas outside physical activity. For example, there were no significant differences in the subscales of nutrition, spiritual growth, or interpersonal relations between women in the intervention group versus women in the control group, though the control group received general prenatal information that discussed these topics. Not only did walkers not score lower, walkers scored significantly higher than the non-walkers in two other subscales outside of physical activity. Walkers scored significantly higher than women in the attention-control group in the areas of health responsibility and stress management.

Such findings suggest improving one behavior through a targeted intervention, such as a walking program, can improve overall health promotion. It is no surprise that the women receiving the walking intervention reported greater participation in physical activity; however, it is interesting that these women also scored higher in total HPLPII scores and in the subscale scores of health responsibility and stress management because they did not receive a specific intervention addressing these topics. Though walkers received less information about good nutrition, spiritual growth, and interpersonal relations than the women in the control group, there

were no significant differences between the two groups and their subscale scores for these areas. It is possible that a direct focus on one behavior is more manageable for women, and the positive effect of increasing that good health behavior spreads naturally to other areas of health promotion.

To further support and broaden this idea, additional behavior-specific interventions should be explored. For example, is a yoga or pilates intervention as effective as a walking intervention? Also, does an intervention targeting nutrition have as strong an impact on overall health promotion as compared to the exercise intervention? These are questions that are important for researchers to answer so practitioners can better advise their pregnant patients and offer interventions according to evidence-based practice. Nurses are one type of practitioner responsible for patient teaching and can be instrumental in implementing these behavior-specific interventions.

Additional research needs to follow high-risk pregnant women receiving attention-control and behavior-specific interventions after childbirth and the postpartum period to determine the relationship between those interventions and the health-promoting lifestyles women practice later in life. It is most cost-effective for practitioners to endorse interventions that are likely to continue influencing women's health and health behaviors following pregnancy. One limitation of this study is the fact that it does not address pregnancy outcomes or follow women after childbirth.

Research results support a targeted walking intervention and its ability to increase participation in physical activity for high-risk pregnant women. However, it would also be beneficial to see if a behavior-specific intervention continued to influence participation in

physical activity after pregnancy, and if this increase in physical activity impacted the recurrence rate of preeclampsia, birth outcomes for both mom and baby, and maternal satisfaction during the postpartum period.

Findings from this study add to and supplement what is known about health promotion and health promotion interventions for pregnant women. However, limitations of the study exist. For example, 123 pregnant women were enrolled; however, only 79 were followed long enough to complete all three HPLPII surveys. Of the 79 women, there was a significant difference ($p = .014$) in race distribution between the intervention and control group, which may have a confounding influence on results. In addition, our measure of health promotion only includes self-report. The HPLPII questionnaire can only score health-promoting behaviors based on how women score themselves, and self-report always presents limitations. For example, women may have been answering according to what they thought the researchers would like to see or what they thought was correct according to previous prenatal exposure and education (Higgins, 1994). Therefore, self-reported results should always be interpreted with caution (Higgins, 1994).

In conclusion, this study suggest women do place increased focus on their health during pregnancy; and healthcare professionals can target this period to enhance health-promoting lifestyles. Both an attention-control and a behavior-specific intervention can be effective in improving overall health behaviors. Focus on a targeted-behavioral intervention, such as enrollment in a walking program, can be beneficial in not only enhancing its targeted area of health promotion, but areas of health promotion outside of physical activity. For example, when women are positively participating in the good health behavior of physical activity, they are more likely to simultaneously enhance other areas of health promotion such as health responsibility and stress management.

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Appendix

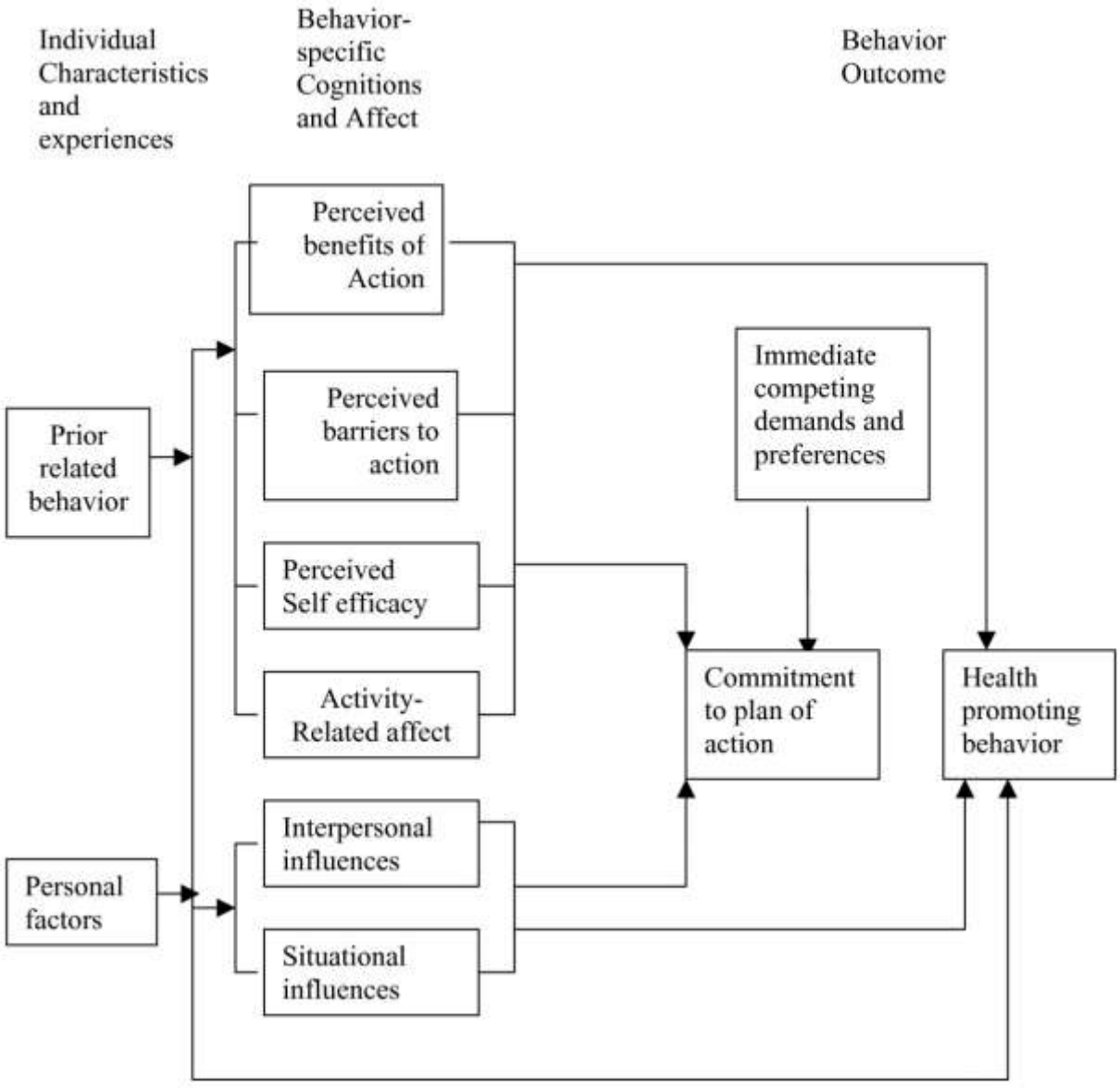

Figure 1. Pender's health promotion model (HPM)

Table 1

HPLPII Total and Subscale Mean Scores for the entire Sample (n=79)

	Baseline	Time 2	Time 3	Significance
Health-Promoting Lifestyle Total Score	2.78±.41	2.91±.43	2.93±.46	F= 20.92 **p= .000***
Subscales				
Health Responsibility	2.74±.48	2.82±.53	2.92±.54	F= 19.11 **p= .000***
Physical Activity	2.03±.57	2.47±.70	2.35±.76	F= 25.89 **p=.000***
Nutrition	2.77±.49	2.89±.48	2.94±.49	F= 17.09 **p= .000***
Spiritual Growth	3.22±.50	3.29±.49	3.28±.56	F= .86 p= .356
Interpersonal Relationships	3.30±.57	3.24±.53	3.30±.55	F= .34 p= .560
Stress Management	2.50±.53	2.71±.52	2.75±.55	F= 18.67 **p= .000***

Table 2

HPLPII Total and Subscale Mean Scores between Groups

C = control group (n = 43) W = walking group (n = 36)

	Baseline		Time 2		Time 3		Significance
	C	W	C	W	C	W	
Health-Promoting Lifestyle Total Score	2.71±.43	2.86±.38	2.77±.42	3.07±.40	2.80±.43	3.07±.45	F = 7.06 **p =.010***
Subscales							
Health Responsibility	2.64±.45	2.85±.51	2.68±.51	2.98±.51	2.79±.55	3.07±.49	F = 5.79 **p = .019***
Physical Activity	2.01±.62	2.05±.52	2.13±.61	2.87±.58	1.94±.59	2.83±.64	F = 25.55 **p = .000***
Nutrition	2.70±.51	2.85±.46	2.81±.48	2.97±.46	2.88±.50	3.00±.49	F = 1.61 p =.209
Spiritual Growth	3.18±.55	3.28±.53	3.22±.49	3.37±.48	3.23±.56	3.33±.57	F = 1.17 p =.283
Interpersonal Relationships	3.22±.63	3.40±.48	3.18±.56	3.31±.50	3.26±.56	3.35±.55	F = 1.51 p =.223
Stress Management	2.40±.52	2.63±.52	2.52±.52	2.93±.43	2.59±.52	2.93±.51	F = 11.13 **p = .001***